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Supervision of Physical Education in the Elementary School

Part I The Supervisor's Viewpoint

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THE STUDY was conducted by a sub-committee of the Committee on Trends as They Affect Physical Education for Women, and was sponsored by the National Association for Physical Education of College Women.

Purpose of the Study

This study was made to determine the nature of in-service supervisory practice in the elementary schools of the United States.

Procedure

1. During the winter and spring of 1951, contact was made with the physical education supervisory officer in the state departments of the 48 states requesting the names of physical education personnel who, in the opinion of the state department, were giving an adequate supervisory service at the elementary level in the various localities of their respective states. The committee was not interested in securing data from public school systems where a below-average service was being rendered. Thirty-four states contributed data for this survey; these states are:

Alabama	Michigan	Oregon
Arkansas	Minnesota	Pennsylvania
California	Mississippi	Rhode Island
Connecticut	Missouri	Tennessee
Delaware	Montana	Texas
Illinois	Nebraska	Utah
Indiana	New Jersey	Vermont
Iowa	New York	Virginia
Kentucky	North Carolina	Washington
Maine	North Dakota	Wisconsin
Maryland	Ohio	
Massachusetts	Oklahoma	

Of 33 replies from state department personnel, supervisory service was reported as follows:

26 states reported 4 to 250 public schools receiving regular supervision from a central office.

Data Secured from the Questionnaires

The public school systems from which the data were secured are listed according to their approximate size.

Size	Eastern District	Midwest District	Central District	Southern District	Northwest District
Over 500,000 population	Baltimore, Md. Buffalo, N. Y.	Detroit, Mich. Cleveland, Ohio	St. Louis, Mo.		
Between 100,000 and 500,000	Jersey City, N. J. Allentown, Pa. Erie, Pa.	Toledo, Ohio Ft. Wayne, Ind. Grand Rapids, Mich. Cincinnati, Ohio	Mpls., Minn. Des Moines, Ia.	Louisville, Ky. Norfolk, Va. Richmond, Va. Ft. Worth, Texas	Seattle, Wash. Spokane, Wash. Portland, Ore.
Between 50,000 and 100,000	Portland, Maine PrinceGeorges, I., Md. Montgomery, Md. Lynn, Mass. Atlantic City, N. J. New Rochelle, N. Y. Johnstown, Pa. McKeesport, Pa. Bethlehem, Pa. Lancaster, Pa. Pawtucket, R. I. Cranston, R. I.	Lansing, Mich. Kalamazoo, Mich. Oak Park, Ill. Terre Haute, Ind. Madison, Wis. Columbus, Ohio	Duluth, Minn. Sioux City, Ia. Cedar Rapids, Ia. East St. Louis, Mo.	Portsmouth, Va. Jackson, Miss. Mobile, Alabama Austin, Texas	Tacoma, Wash.
Between 10,000 and 50,000	Bangor, Maine Sanford, Maine Frederick, Md. Framingham, Mass. Hackensack, N. J. West Orange, N. J. Montclair, N. J. Norristown, Pa. Bennington, Vt. Barre City, Vt. Brattleboro, Vt.	Lima, Ohio Oshkosh, Wis. Janesville, Wis. Battle Creek, Mich. Jackson, Mich.	Rochester, Minn. Austin, Minn. Albert Lea, Minn.	Hattiesburg, Miss. Newport News, Va. Wilmington, N. C. Alexandria, Va. Clarksville, Tenn. Fayetteville, N. C. Stillwater, Okla.	Walla Walla, Wash. Butte, Mont. Bellingham, Wash. Eugene, Oregon

Below 10,000	Dover, Delaware Springfield, Vt.	Dayton, Ohio	Bemidji, Minn. Clayton, Mo.	Winchester, Ky. Lebanon, Tenn. Versailles, Ky. Tupelo, Miss. Franklin, Ky.	Renton, Wash. Corvallis, Ore. Lewistown, Mont.
Others		Antigo (Langlade County) Wis.		Wayne (McClain) Oklahoma Northampton Co., N. C.	

19 states reported 4 to 150 public schools receiving supervision from a teacher in a nearby high school.

18 states reported 3 to 700 public schools receiving supervisory or consultant service within the school.

2. Contact was then made with local supervisory personnel requesting that they co-operate in a study of in-service practices used.

OPERATION OF SUPERVISION PROGRAM

Number of years
(0), (1) 3, (2) 1, (3) 7, (4) 6, (5) 6, (6) 5, (7) 0, (8) 2, (9) 0, (10) 63
Continuous operation: 93
Interrupted operation: 9
90% of all of the public school systems have had a supervisory program in continuous operation from 3 to more than 10 years
61% have had such a program for 10 years or more
9% report interrupted operation

COMMON PROCEDURES USED BY CLASSROOM TEACHER TO ANALYZE SKILLS

	Number School Systems	Rank Order
None observed	5	
Demonstration by skilled child	83	1
Demonstration by teacher	83	1
Pictures	37	3
Demonstration by supervisor	5	4
Discussion	3	5
Motion pictures	2	6
Demonstration by group children	1	7
Records	1	7
Combination	1	7

The procedures used by the classroom teacher most frequently in the analysis of skill are demonstrations by the skilled child and demonstrations by the teacher each in 80% of the public school systems and the use of pictures in 36%. About 5% used no procedures in analysis of skill.

TYPES OF INFORMATION STRESSED REGULARLY BY CLASSROOM TEACHER

	Number School Systems	Rank Order
None stressed		
On rules	86	1
On safety	85	2
On body mechanics	58	3
On related health habits	58	3
Social attitudes	8	5
Skills	3	6
Leisure time	1	7

The types of information stressed regularly by the classroom teacher are rules in 83% of the systems, safety in 82%, body mechanics and related health habits each in 56%.

3. A questionnaire was sent to the local supervisors. Replies were received from 103 public school systems in 28 states; questionnaires were not received from the following states mentioned above: Arkansas, California, Connecticut, Nebraska, North Dakota, Utah.

FREQUENCY OF USE ON SELF-DIRECTION BY CHILDREN IN INSTRUCTIONAL PERIOD

	Number School Systems	Rank Order
Frequency in the unit[1]	59	1
Occasionally in the unit	36	2
Every lesson	15	3
Never	4	4

[1] The "unit" is the long-view plan, such as a "Resource Unit" from which teaching units and lesson plans are made.

Self-direction by the children is used most commonly in the unit, 57% of the systems reporting the use of it frequently in the unit, and 35% occasionally in the unit.

PROVISION MADE FOR HANDICAPPED CHILD

	Number School Systems	Rank Order
Yes	53	1
No	41	2
Nature of provision:		
Do what they can	28	1
Special corrective group	27	2
Modified activity	19	3
Do nothing	14	4

Provision for the handicapped child is made in 51% of all the school systems; in about half of these schools the children are either placed in a special corrective group or encouraged to do what they can. Of the 53 schools, 36% modify the activity for the handicapped child. Of all the school systems, 40% make no provision for the handicapped child.

TYPES OF PROCEDURE USED TO STIMULATE CHILD OF SUPERIOR ABILITY

	Number School Systems	Rank Order
None	4	
Leadership opportunity	93	1
Intramural competition	80	2
Inter-school competition	43	3
Special interest groups	7	4
Play days	1	5
Demonstrations	1	5
Certificates of achievement	1	5
Joy of doing well	1	5

The most common procedure for stimulating the child of superior ability is providing leadership opportunity in 90% of the school systems through intramural competition in 77% and inter-school in 41%. No stimulation was used in about 4% of the school systems.

RECURRING LEARNING PROBLEMS AND PROCEDURES TO MEET THEM

Learning Problems	Most Helpful Procedure	No. School Systems	Rank Order
Ways of introducing new skills	Demonstrations	50	1
	Films	11	2
	Description	5	3
	Lead-up games	5	3
	Relating new to old	2	5
	Whole-part-whole	2	5
	Relays	1	6
Practice of skills to meet standard	Drills	23	1
	Lead-up games	13	2
	Informal practice	9	3
	Squad	9	3
	Self-testing	5	5
	Review	3	6
Setting standards for each grade	Tests	11	1
	None set	9	2
	Set by course of study	8	3
	Set by teacher	8	3
	Set by supervisor	6	5
	Student appraisal	1	6

The top-ranking procedures used in recurring learning problems are the demonstration in introducing new skills in 48% of the systems, drills for the practice of skills to meet a standard in 22% of the systems, and setting standards by means of tests for each grade in 10% of the systems.

CHIEF LACKS IN PREPARATION OF CLASSROOM TEACHER TO HANDLE PHYSICAL EDUCATION

	No. School Systems	Rank Order
Repertoire of activities		
Dance and rhythm materials	84	1
Knowledge concerned with analysis of skill	82	2
Background on methods of teaching physical education	78	3
Repertoire of activities (*continued*)		
Stunts and self-testing materials	74	4
Team games	49	5
Low organized games	23	6
Skills	3	7
General lack preparation	3	7
Exercises	2	9
Organization	1	10
Rules	1	10
Progression	1	10
Body mechanics	1	10
Dramatic and creative work	1	10
Descriptive	1	10

The chief lacks in the preparation of the classroom teacher to handle physical education are: first, lack of repertoire of dance and rhythm materials found in 81% of the public school systems; second, lack of knowledge of analysis of skill found in 79%; and third, lack

of background on method of teaching physical education found in 75%. Other top-ranking lacks in repertoire of activities were those in stunts and self-testing materials in 71%, in team games in 47%, and low organized games in 22% of the public school systems.

USE BY CLASSROOM TEACHER OF INFORMATION ON MATURATION CHARACTERISTICS IN TEACHING PHYSICAL EDUCATION

	No. School Systems	Rank Order
None used	20	
In better understanding of children	70	1
In adapting experiences to various age levels	63	2

The classroom teacher made use of information on maturation characteristics in physical education by better understanding of the children in 68% of the public school systems and in adapting experiences to the various age levels in 61%.

PROCEDURES FOUND TO BE EFFECTIVE IN ASSISTING TEACHER WITH COMMON PROBLEMS OF METHOD

	No. School Systems	Rank Order
Formulation of goals of instruction in physical education		
Literature: bulletins, units, lesson plans	32	1
Group conferences and workshops	27	2
Others	15	3
Curriculum construction	7	4
Individual conferences	6	5
Methods of organizing class in space		
Demonstrations	36	1
Squads and squad leaders	23	2
Others	20	3
Conference	7	4
Staggered schedule	3	5
Analysis of skill		
Demonstration	36	1
Discussion	9	2
Others	8	3
Pointing out errors	5	4
Films and pictures	5	4
Bulletins	3	6
Stimulation of interest in activity to be learned		
Demonstrations, exhibitions and other publicity	21	1
Others	20	2
Competition	12	3
Evaluation	9	4
Workshops and clinics	9	4
Motion pictures	5	6
Correlation	5	6
Discussion	6	8

The over-all procedures found to be effective in assisting the teacher with common problems were the demonstration in the use of both analysis of skill and methods of organizing a class in space, each procedure found in 34% of the public school systems, and again the use of the demonstration in stimulation of interest in the activity to be learned in 20%; the use of literature (e.g. bulletins, units, lesson plans) was a top-ranking procedure in the formulation of goals of instruction in physical education in 31% of the public school systems; the use of squads and squad leaders used for the problem of organizing the class in space in 22% of the public school systems, and the use of group conferences and workshops in 25%.

PROCEDURES ADVOCATED IN GROUPING CHILDREN

	No. School Systems	Rank Order
None being advocated	2	
By grade	64	1
Flexible grouping	38	2
By sex	20	3
By age-height-weight	16	4
By tests	7	5
By competition	5	6

The most frequently mentioned procedures advocated in grouping children are by grade in 62% of the public school systems, on a flexible basis in 37%, by sex in 19%, and by age-height-weight in 15%.

TYPES OF PLANNING USUALLY DONE BY CLASSROOM TEACHER

	No. School Systems	Rank Order
Unit plans		
No use made of unit plans	8	
Free supplementation to those sent	56	1
Plans creatively devised by teacher	44	2
Careful adherence to those sent by local supervisor	31	3
Careful adherence to those sent by state office	6	4
Some adherence to plans	6	4
Course of study	2	6
Student projects	2	6
Lesson plans		
No use made of lesson plans	4	
Free supplementation to those sent	52	1
Plans creatively devised by teacher	47	2
Careful adherence to those sent by local supervisor	28	3
Teacher-pupil planning	4	4
Careful adherence to those sent by state office	3	5

In the unit planning usually done by the classroom teacher, the greatest frequencies were found in the following: free supplementation to plans sent found in 55% of the public school systems, creatively devised plans by the teacher in 42%, and careful adherence to unit plans sent by the local supervisor in 30%. The frequencies in lesson planning are very similar, that is, free supplementation to those sent found in 50% of the public school systems, lesson plans creatively devised by the teacher in 44% and careful adherence to those sent by the local supervisor in 27%.

TYPES OF STIMULATION GIVEN TO TEACHERS TO RELATE PHYSICAL EDUCATION TO OTHER SUBJECTS

	No. School Systems	Rank Order
None given	2	
To social studies		
Dances and games	37	1
General	33	2
Citizenship	8	3
Leisure unit	2	4
To music		
Co-ordination of dances and rhythms	70	1
Programs	6	2
Marching	2	3
Others		
Health ed. (nutrition, safety, body mech.)	8	1
Art (models, posters)	7	2
Arithmetic (scoring, storekeeper, tournament)	6	3
Reading	1	4
Nature study	1	4

The types of stimulation given to teachers to relate physical education to other subjects were most frequently given in the area of music through co-ordination of dances and rhythms in 68% of the public school systems and next in the area of social studies in relation to dances and games in 36%.

TYPES OF EVALUATION CARRIED ON BY CLASSROOM TEACHER

	No. School Systems	Rank Order
No evaluation used	16	
Regular informal subjective evaluation	56	1
Health examination	47	2
Informal tests	45	3
Standardized tests	11	4
Others	9	5

The types of evaluation chiefly used by the classroom teacher are in order of frequency: regular informal subjective evaluation in 54% of the public school systems, health examinations in 45%, and through informal tests in 43%.

TYPES OF SOURCE MATERIALS AVAILABLE TO CLASSROOM TEACHERS IN SCHOOL, CIRCULATING LIBRARY, OR SCHOOL LIBRARY, MATERIA CENTER, MIMEO. MATERIAL, P.E. DEPT., BOARD OF EDUCATION LIBRARY

	No. School Systems	Rank Order
Bulletins	119	1
Books: game	91	2
dance	84	3
stunt and self-testing	79	4
Periodicals	47	5
Records	23	6
Films	6	7
Professional	3	8
Books: health	3	8
Demonstrations	1	10

Source materials were found to be available to the classroom teachers through the school library, materia centers, board of education library, and the physical education department.

Among the types of source materials, bulletins are used freely by the various public school systems, some using several kinds; the other most commonly used source materials are books on games in 88% of the public school systems, books on dance in 81%, books on stunts and self-testing activities in 76%, periodicals in 45%, and records in 22%.

GENERAL IN-SERVICE PROCEDURES USED

	No. School Systems	Rank Order
Visitations: total	75	1
Supervisor scheduled	51	
Supervisor non-scheduled	20	
Teacher inter-visitation	8	
Demonstrations: total	71	2
Special demonstration for needs	13	
In conjunction with conventions	11	
Small groups	9	
General stimulation of interest	6	
School programs	4	
Spring demonstrations	3	
First week of school	2	
Bulletins: total	68	3
Special bulletins	19	
Syllabus	8	
Unit	8	
Lesson plans	4	
Group conferences: total	58	4
For sharing ideas	24	
For building problems	8	
For new teachers	8	
For individual problems in teaching	4	
For setting up new units	4	
For year's goals	2	
Individual conferences: total	52	5
Purpose: individual teaching problems	12	
Purpose: orienting new teachers	8	
Purpose: exchange of ideas	7	
Frequency: as needed	15	
Frequency: after each observation	7	
Workshop or short course: total	45	6
New activities	10	
Workshops at start of year	6	
Extension courses	4	
Weekly	3	
Clinics	2	
County or district	2	
Local	2	
Monthly	2	
State	1	

Of the in-service procedures, the order of frequency of the general areas is: visitation in 72% of the school systems with the scheduled visit of the supervisor in two-thirds of the schools having visitation, demonstrations in 69%, bulletins in 66%, group conferences in 56% with general sharing of ideas as the purpose in almost half of the schools using the group conference, individual conferences in 50%, and the workshop or short course in 43%.

TOTAL MINUTES INSTRUCTION PER WEEK

Minutes	No. School Systems	Rank Order
150	42	1
100	17	2
Below 100	15	3
125	10	4
200	5	5
175	2	6
250	2	6
275	2	6
225	1	9
350	1	9
325	—	—
300	—	—

The range of minutes per week for instruction in physical education is from 350 to less than 100 minutes. The highest frequencies are as follows: 40% of the school systems have 150 minutes per week, 16% have 100 minutes, and 14% have less than 100 minutes.

SUFFICIENCY OF HAND EQUIPMENT

	Yes	No
For continuity throughout period	91	11
For interesting variety of activity throughout year	87	14

Hand equipment is apparently sufficient in the large majority of the cases, in 88% of the schools sufficient for continuity throughout the period and in 84% for interesting variety of activity throughout the year.

PERSON CARRYING MAJOR RESPONSIBILITY FOR TEACHING PHYSICAL EDUCATION

Classroom teacher	57
Special physical education teacher	30

The person who carries the major responsibility for teaching physical education is the classroom teacher in 55% of the school systems and the special physical education teacher in 29%.

RECURRING ADMINISTRATIVE PROBLEMS

	No. School Systems	Rank Order
Lack of space and facilities	18	1
Developing a progressive viewpoint and interest	12	2
Time	9	3
Other	9	3
Acceptance by administrators	8	5
Lack of understanding by parents and pupils	8	5
Orienting new teachers	6	7
Finance	5	8
Teacher load	3	9
Pressure for interschool competition	3	9
Relationship to other departments	1	11
Health examination	1	11

SPECIFIC PROCEDURES USED TO IMPROVE ABOVE CONDITIONS

	No. School Systems	Rank Order
Teacher workshops and clinics	20	1
Conference	20	1
Others	18	3
Administrative conf., school board, med. soc.	13	4
Reorganization—school schedule	11	5
Planned publicity program	10	6
Careful financing	6	7
Parents, P.T.A., community council	6	7
Pupil planning	5	9
Yearly reports	3	10
Research	1	11

The conference and teacher workshops and clinics topped the list of procedures used to meet the recurring administrative problems, each being used in 19% of the public school systems; other frequently used procedures presented were reorganization of the school schedule and a planned publicity program.

Conclusions

The above data undoubtedly reflect the better practices now being used at the elementary school level in public school systems selected by the state departments as having an adequate supervisory service.

The fact that 90% of the school systems have had supervisory programs in continuous operation from three to more than ten years is doubtless one conditioning factor. Other favorable factors are: the fact that over half of the public school systems have an average of 30 minutes or more per day of instruction in physical education, that sufficient hand equipment is available in four-fifths of the school systems, and that the elementary school administrator shows understanding of the purposes of physical education in almost four-fifths of the school systems.

This study, like earlier ones, shows that the classroom teacher carries the major responsibility in the teaching of physical education; 55% of the selected school systems made this report. Furthermore, although there is evidence that the elementary classroom teacher in more than half of these public school systems is making use of some procedures in the analysis of skill, is stressing some types of information in relation to physical education activities, considers self-direction by children, makes provision for both the child who is handicapped and the child of superior ability, and freely supplements both unit and lesson plans sent to her; nevertheless, she has the following very definite lacks in her preparation: lack of repertoire of dance and rhythm materials in 81% of the school systems, lack of knowledge of analysis of skill in 79%, lack of background on method of teaching physical education in 75%.

However, in school systems that are average and above in supervisory service in physical education, handicapping factors are obviously inadequate preparation of the classroom teacher, and there is definite evidence of lack of space and facilities, interest, and time in an appreciable percentage of the school systems.

The Emotional Reactions of College Athletes

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THIS RESEARCH was preceded by exploratory efforts by the first writer in 1929 at Evansville College and by the second writer in 1947 at the University of Denver (15). The two years (1948–1947) of investigation involved in the present research at Boston University required a type of co-operation on the part of coaches which was a tribute to their open-mindedness and demonstrated their recognition of the need for improved coaching through the aid of systematic research.

Psychologists have traditionally found the study of emotion an exasperating, though fascinating, subject. As a rule, experimental research upon emotion has been carried out in college laboratories where the circumstances ordinarily cannot simulate normal life conditions. The present research was carried out "on the firing line" of high pressure college football competition.

Statement of the Problem

To explore the emotional aspects of athletic sports contests, to the end that this competitive phase of modern school life may be more fully understood as an educational experience.

It was hoped that some light might be thrown upon:

(a) Certain physiological concomitants of emotion in a series of genuine emotionally charged situations.

(b) The extent to which men are emotionally disturbed in relation to the anticipated importance of contests.

(c) Laying a further basis for comparing the emotional "charge" characteristically associated with various athletic sports contests.

(d) The implications of emotional upset for various aspects of the athletic conditioning program.

(e) Which physiological indicator of the test battery would, when used alone, best represent the battery.

Research tools

Four tests of emotional reactivity were selected for this study: pulse rate, systolic blood pressure, diastolic blood pressure and galvanic skin response

(G.S.R.). All four indices have been used by earlier investigators of human emotion and a limited validity has been established for each (2, 3, 4, 7, 9, 13, & 15).

A special G.S.R. apparatus no larger than a camera was designed and constructed for this research (22). The one-quarter inch electrodes were embedded one inch apart at one end of a plastic bar, the dimensions of which were 12 inches by 2 inches by ½ inch. Subjects being tested merely supported the bar by placing the electrodes on two fingers of one hand (palm up) and elevating the bar to approximately 30 degrees. This technique insured a constant pressure on the finger surfaces (17, 22, 20). The subjects always used the same two fingers (index and middle fingers of right hand) when tested. Approximately 5 seconds were required for the administration of the G.S.R.

A reliability study of the four indices employed in this study and of the investigator was conducted with 48 college seniors. The battery was administered to the subjects once and then readministered to them approximately five minutes later. The resulting correlation coefficients were above .94 in each instance. Significance ratios indicated that the observed differences in means from Test 1 to Test 2 could not be accepted as true differences.

The research tools were employed in a second preliminary study involving nineteen varsity track men as subjects. Records were kept on these men throughout the 1949 spring season. Important administrative details were worked out in relation to establishing "normal" levels of reactivity for individuals and devising means of testing just prior to scheduled meets. In addition to providing interesting information on the reactions of track men, this study established the research pattern which was to be employed in the major project. Table 1 shows the mean reactions of the track subjects for the season.

TABLE 1

Mean Emotional Reactivity of the Track Team As Reflected by Physiological Indicators

Test	Normal M_1	Pre-Contest M_2	M_1–M_2	Level of Confidence
G.S.R.	7.1 (microamps)	8.8	1.7	less than 1%
Systolic B.P.	117. (mm hg)	127.7	10.7	less than 1%
Diastolic B.P.	81.7 (mm hg)	82.5	.8	1.6%
Pulse rate	69.6 (per min.)	79	9.4	less than 1%

Research Procedure

The major project was the testing of the Boston University football team just prior to each of its games of the 1949 season. (The investigator was unable to accompany the team for one game of the season.)

1. *Subjects.* 42 football players served as subjects throughout the season. It should be noted that most of the team members were World War II veterans and were somewhat older and more experienced competitors (average age 22 years and average experience 7 years) than the usual college athlete. It is consequently entirely possible that in terms of emotional reactivity these subjects did not constitute a representative group of college athletes.

2. *"Normal" Reactions* (Category 1). A "normal" G.S.R., pulse rate and blood pressure were established for each subject. This value was the median of five measures taken with each instrument under the following conditions:

(a) The subjects had not exercised vigorously either on the day tested or on the day before that.

(b) The subjects had not eaten within two hours of being tested.

(c) A scheduled game was not to be held for at least two days.

(d) The subjects were under no known emotional stress at the time of testing. It seemed reasonable that in spite of extraneous emotion factors, an average of these five sets could be taken as approximating the true normal of each subject.

This "normal" value on each instrument was the criterion for all subsequent changes in reactivity prior to games.

3. *Pre-game Reactions* (Category 2).

(a) The subjects were tested in the dressing rooms while they made preparations for play. Test period: about 20 minutes. Testing was completed approximately 25 minutes before game time. Three carefully trained graduate students assisted in the obtaining of the pulse rates and blood pressures.

(b) Each subject sat quietly for one minute before being tested. This limited rest period was necessitated by the circumstances of the pre-game testing.

(c) Prior to being tested, the subjects: (1) had not exercised vigorously (had, indeed, been resting in nearby quarters); (2) had not eaten within two hours; (3) were under no known emotional stress due to causes other than the game situation; (4) had not as yet been subjected to any form of "pep talk."

Major Findings

1. Figure I shows the relative excitation of the team for each game as compared with the established "normal," in terms of galvanic skin response. Graphic representation of systolic blood pressure was found to be quite similar in form to the G.S.R. Pulse rate, too, followed a similar, though not as variable a pattern.

Of interest in Figure I is the fact that it seems to bear a suggestive relationship to the following circumstances. The Boston University team began the season with aspirations of becoming one of the country's top teams. Early in the season the football coaching staff ranked each coming game in terms of its probable "importance" to Boston University's progress. The coaches ranked the games independently as follows: 1, 2, 6, 5, 7, 4, 3. After the third game (number 2 on the chart) there were three games with teams which, as the season developed, were known to be comparatively weak. Game 6, on the other hand, was a bowl game test which, after a considerable build-up, was lost by Boston by one point. The seventh game was plainly anticlimactic; many players considered the season over and took little interest in this contest. The result was a surprise loss for Boston University. The extremely low mean G.S.R. for this seventh contest suggested before game time that the team was extraordinarily "down" for the game.

2. Part of the statistical findings of this research are summarized in Table 2. Raw scores were converted into standard scores for purposes of drawing com-

TABLE 2
Correlation and Significance Ratios: "Normal" vs. "Emotional" or "Pre-contest"

	Normal	Games							Avg. correlation of games*	Approx. level of confidence
		1	2	3	4	5	6	7		
Galvanic Skin Response										
Mean =	6.3	9.8	9.48	8.8	8.1	7.1	9.1	5.13		
Standard Deviation =	2.43	3.2	3.35	3.6	3.3	3.3	3.64	3.17		
Standard Error =	.37	.53	.53	.56	.53	.52	.58	.50		
Correlation		.71	.54	.66	.50	.61	.62	.44	.57	less than 1%
Significance Ratio		9.45	6.9	12.5	3.83	6.1	6.1	8.2		
Systolic Blood Pressure										
Mean =	123.3	141	141.3	134.3	134	129	136.5	129		
Standard Deviation =	6.3	6.96	10.3	8.5	13.1	9.8	6.7	8.4		
Standard Error =	.99	2.1	2.15	1.4	2.1	1.74	1.1	1.45		
Correlation		.5	.29	.29	.2	.43	.2	.21	.30	less than 1%
Significance Ratio		8.57	7.2	6.0	4.2	2.9	7.3	2.65		
Diastolic Blood Pressure										
Mean =	76.4	85.34	78	76.9	76	76.4	77.7	79.6		
Standard Deviation =	4.4	4.12	9.4	6.62	10.56	6.12	6.5	4.98		
Standard Error =	.68	1.25	1.9	1.1	1.76	1.1	1.05	.87		
Correlation		.04	.05	.13	.37	.32	.33	.24	.10	more than 5%
Significance Ratio		6.0	.85	.48	.21	1.8	1.21	2.3		
Heart Rate										
Mean =	66.4	83.0	72.5	72	76	75.7	84	80		
Standard Deviation =	7.3	11.97	8.9	8.55	10.56	10.5	9.78	13.35		
Standard Error =	1.14	2.1	1.65	1.38	1.71	1.8	1.56	2.15		
Correlation		.29	.54	.35	.29	.47	.23	.33	.38	less than 1%
Significance Ratio		6.1	5.3	3.86	3.2	5.2	10.3	6.4		

* Procedure followed in averaging correlations: reference 19, p. 303.

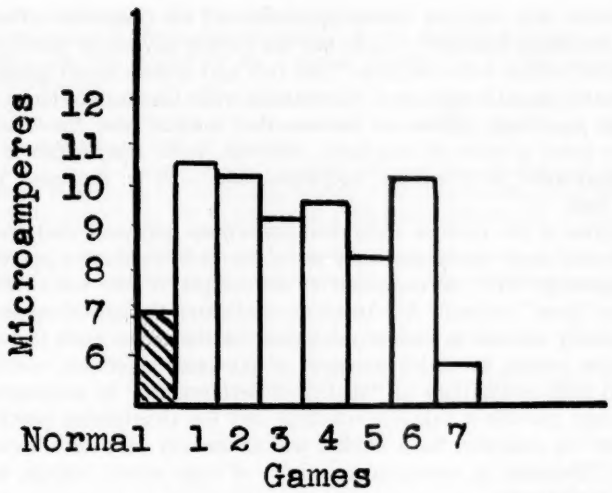

Fig. I. Mean Reactivity of the Team Under "Normal" Conditions (Not Excited or Emotionally Upset) and from Game to Game, As Measured by Galvanic Skin Response. (Games 1, 2, 6 & 5 (in that order) were rated "most important" by the coaches before the season. Before game 7, the team was plainly apathetic; quality of play was low.)

parisons between instruments. Group and individual analyses were made both statistically and graphically so as to deal with the problems suggested.

Summary and Conclusions

The pre-contest emotional reactions of the Boston University track and football teams were measured throughout the respective 1949 seasons by means of four physiological indicators: galvanic skin response, systolic blood pressure, diastolic blood pressure, and pulse rate. A team "normal" or "non-emotional" value was derived to serve as the basis for determining extent of emotional upset before each contest. Before the football season began, the coaching staff estimated the probable importance of each scheduled game; this estimate was eventually compared with the extent of excitation measured before the various games.

1. Emotional disturbance just preceding contests is evidently of sufficient intensity to be measured via three of the four physiological indicators selected: G.S.R., pulse rate and systolic blood pressure.

2. The battery could distinguish category 1 ("normal") from category 2 (pre-contest).

3. A close relationship was found to exist between the coaches' preseason estimate of the importance of the games and the measured team reactions. In light of this relationship, the hypothesis is suggested that emotional reactivity goes with "upness" for football competition. In this research, the team was measurably "up" or "down" before every contest.

4. Galvanic skin response closely approximated the composite criterion and was the best single indicator. G.S.R. had the further advantage that it could be administered within a few seconds. Pulse rate and systolic blood pressure were approximately equal in relation to the criterion while the diastolic blood pressure showed no significant differences between the "normal" and the "disturbed." From the point of view of simplicity, however, pulse rate, which is demonstrably responsive to emotional excitation, may well be the most practical coaching tool.

5. Analysis of the data on individual performers indicated that team reactions reflected most nearly the reactions of the individuals who played in the games regularly. With the exception of the one player who was rated by the coaches as "great" (actually All-American candidate), the individual performers were markedly variable in their physiological reactions from game to game.

6. Future studies in which measures of pre-game emotional reactions are correlated with evaluations of "quality of performance" in subsequent competition may provide a valuable coaching tool for ascertaining psychological "readiness" to compete. Such studies will necessarily take into account the probable differences in emotional reactivity of high school, college, and professional performers.

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Learning to Juggle: II. A Study of Whole and Part Methods

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PROBABLY FEW people will dispute the important role practice has in the learning of a motor skill. In a previous investigation,[1] the present authors have enumerated several of the variables which contribute to the effectiveness of practice sessions. For that experiment two of these variables—the length of practice and the duration of rest—were selected and an investigation was made on the effect of changing the ratio between the two as the subjects learned to juggle. The present study is directed at another of the practice variables, specifically, practice method. Should the learner always perform the entire skill? Should he attempt to break the performance up into parts and practice these? Should he adopt some combination of the two?

Although there are numerous reports of data collected on the whole-versus-part problem, few relate to the learning of motor skills. Grace McGeoch summarized the experimental data as it existed in 1931. She found nine experiments on learning acts of skill, and noted that ". . . roughly comparable procedure and practice conditions on different motor problems have given contradictory results."[2] Her conclusion was that ". . . there is no inherently superior method."[3] Others have endorsed the combination approach as the most useful solution to the problem. For example, Woodworth states that ". . . in a practical situation it is probably best to start with the whole method while feeling free to concentrate at any time on a part where something special is to be learned."[4] John McGeoch also stresses the same point by writing ". . . a subject may use whichever method he has practiced and prefers without fear that he is employing an extremely inefficient one. Practically, one might well follow Woodworth's suggestion and employ the whole method with special attention to and repetition of difficult or important parts as one goes along, thus combining the

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[1] Clyde G. Knapp and W. Robert Dixon, Learning to Juggle: I. A Study to Determine the, Effect of Two Different Distributions of Practice on Learning Efficiency, *Research Quarterly*, 21: 331–36 (Oct. 1950).

[2] Grace O. McGeoch, "Whole-Part Problem," *Psychological Bulletin*, XXVIII (Dec. 1931) p. 732.

[3] Grace O. McGeoch, *ibid.*, p. 738.

[4] Robert S. Woodworth. *Experimental Psychology*. New York: Henry Holt and Company. 1938. p. 223.

whole method with a form of the part method."[5] The present report describes two tests of the hypothesis that the combination of methods induces the most efficient learning.

Procedure

Selection of Subjects. The subjects in the experiment were University of Illinois male Seniors majoring or minoring in physical education. All potential subjects who made five consecutive catches in three pre-test performances were eliminated from the experiment.

Matched pairs of subjects were established on the basis of athletic experience. In addition each subject was asked to rank the other subjects as to probable rate of learning to juggle. Since these men had observed each other in several "activity courses," they had valid judgments as to which men had the most ability in learning a new motor skill. On the basis of these data, two groups of matched pairs were created, 17 pairs in one group, and 12 pairs in a second group.

Practice Preparations and Instruction. Both groups were given the task of learning to juggle three paddle tennis balls using daily practice lessons of five minutes duration. In both Group I and Group II the pairs were split to form two sections within each group. All subjects had "learned to juggle" when they succeeded in making 100 consecutive catches. One section in Group I used only the whole method of practice. The instructions given to this section are reported in the previous experiment.[6] The second section of Group I was required to follow a fairly rigid procedure involving practice with none, one, two, or three balls as prescribed. The following outline shows how the practice sessions were utilized by this section:

A. First Practice
   1. One and one-half minutes
      Without use of a ball, practice hand and arm movements to achieve proper motions and rhythm.
   2. One and one-half minutes
      Practice tossing and catching one ball to achieve proper tosses and catches
   3. Two minutes
      With two balls, practice tossing and catching to achieve ability to (a) toss one ball and immediately catch another, (b) use of eyes to view two moving balls, and (c) establish "hand-eye" coordination necessary in tossing and catching more than one ball.

B. Second Practice
   Repeat the schedule of the first day of practice.

C. Third Practice
   1. One minute without use of a ball.
   2. One minute with one ball.
   3. Three minutes with two balls.

D. Fourth Practice
   1. One minute with one ball.
   2. Two minutes with two balls.
   3. Two minutes with three balls.

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[5] John A. McGeoch. *The Psychology of Human Learning.* New York: Longmans, Green, and Company. 1945. p. 196.

[6] Clyde G. Knapp and W. Robert Dixon. *Op. cit.*, p. 333.

E. Fifth through Tenth Practices
   1. For three minutes of each practice session each learner may divide practice time as he wishes between:
      (a) Arm movements without use of a ball.
      (b) Tossing and catching one ball.
      (c) Tossing and catching two balls.
   2. For two minutes each learner may practice as he wishes—no ball, one ball, two balls, or three balls

F. Eleventh and Subsequent Practices
   Each learner may practice with no ball, one ball, two balls, or three balls as he wishes *except* that not more than one-half of the practice time in any one session may be devoted to practice with three balls.

One section of Group II likewise was required to use only the whole method. The subjects in the second section of Group II were permitted to freely choose their practice method. These subjects could elect to practice with all three balls or any part thereof for as long as desired within the five-minute practice session.

Results

Table 1 shows the performances of the two sections in Group I. It may be noted that the "whole" section "learned to juggle" in the average time of 64.06 minutes with a range of 27 minutes to 95 minutes. The rigid part-whole section "learned to juggle," on the average, in 77.00 minutes, ranging from 44 to 121 minutes. The Student-Fisher *t* test was used to compute the significance of the difference between the means. A *t* value of 1.97 was obtained which is significant at the 10 per cent level of confidence.

Table 2 presents the comparison of the average time required to learn to juggle by the two sections of Group II. The "whole" section of Group II completed their task in the average time of 71.25 minutes, ranging from 23 minutes to 132 minutes. The free choice part-whole section averaged 92.66 minutes in

TABLE 1

Comparison of the Whole Method Section and the Rigid Part-Whole Section in Terms of the Mean Number of Minutes Required to Learn to Make 100 Catches in Juggling Three Balls

Group I	N	Mean	σ	Diff	σ Diff	t	P
Whole	17	64.06	17.24	12.94	6.26	1.97	<10
Part-Whole (Rigid)	17	77.00	18.17				

TABLE 2

Comparison of the Whole Method Section and the Free Choice Part-Whole Section in Terms of the Mean Number of Minutes Required to Learn to Make 100 Catches in Juggling Three Balls

Group II	N	Mean	σ	Diff	σ Diff	t	P
Whole	12	71.25	36.50	21.41	19.60	1.21	<30
Part-whole (free choice)	12	92.66	53.04				

reaching the criterion of 100 consecutive catches. The range of times for this section was from 40 minutes to 180 minutes. Again the Student-Fisher t test was applied, and a t value of 1.21 was derived. This is significant at the 30 per cent level of confidence.

Discussion of Results. We have come to expect wide individual differences among subjects learning any skill. The current groups supplied numerous examples of this situation. One subject learned to juggle almost eight times as fast as another subject. The findings in this respect are in agreement with the previous study of juggling made by the present authors.

It is apparent that the t values obtained in the study do not meet the rigid requirements of the null hypothesis at the 5 per cent level. However, the trend favors the "whole" approach as compared with either of the "part" methods employed. If the N of the study were to be increased, our prediction would be that the "whole" approach to the task would prove to be significantly better.

The above prediction stems from our observations in this study as well as our previous experiences in sensory-motor learning. It may be noted that the "whole" method as employed in juggling forces the learner to perform constantly at speed. He cannot sacrifice speed for accuracy but has to maintain the speed inherent in the performance. On the other hand, no observable benefits accrued to those subjects who practiced passing one or two balls at a time, thereby slowing the movement and increasing accuracy during that portion of the practice session. It seems clear that in many motor skills the attempt to improve performance by slowing down movement while building up accuracy is actually placing the learner in a qualitatively different situation. The slower movement is not building up the kinesthetic sensitivity necessary for good performance in motor skills. Evidently, there is little of transferable value in the slow performance when the subject is called upon to operate at speed.

Summary and Conclusions

Two groups of matched pairs were formed to test the hypothesis that a combination of whole and part methods induces the most efficient learning. Male college Seniors in physical education served as subjects. The men were matched on the basis of previous athletic experience and the opinions of the subjects. One section of Group I practiced juggling three paddle tennis balls five minutes daily using only the whole method. The other section of Group I practiced the same task but was forced to follow a fairly rigid part-whole practice procedure. In Group II, one section used exclusively the whole method while the second section followed a free choice part-whole method.

Within the limits of the evidence, the following conclusions seem warranted: (1) subjects using the whole method tended to attain the criterion most rapidly; (2) the hypothesis that a combination of whole and part methods secures the more efficient learning was contraindicated; (3) the initial accuracy attained by the subjects using the part-whole method did not have transfer value.

A Critique on the Use of Height-Weight Factors in the Performance Classification of College Men

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FOR MANY YEARS one of the most persistent efforts of physical educators has been that of attempting to equalize physical performance differences among individuals through the factors of age, height, and weight.

That more efficient teaching is possible with homogeneous groups is a principle generally accepted in all phases of education. In the gymnasium, in the pool, and on the athletic field such a concept is no less sound than in the classroom. Equating physical differences in terms of size and maturity, however, presents numerous problems, and although physical educators have been experimenting with the factors of age, height, and weight in this regard since previous to the first World War, the result has been mainly a widespread dissatisfaction with the practical aspects of the effort. Theoretically, currently used classification schemes are effectual for college men; actually they fail in their purpose so frequently that many people in the field are convinced that except for obvious extremes, age-height-weight schemes classify little better than will chance alone.

As long ago as 1914, Richards presented the first published report of a classification method based on age, height, and weight.[1] This basic idea has been developed and refined by many students, and has been widely used in one form or another to the present day. Most of these schemes have been proposed for use with elementary or high school students because of the fact that it is with these age groups that the variables under consideration are the most potent in influencing physical performance. The classification of older men through the use of these factors, however, has not been neglected. Such grouping in terms of height and weight has been the subject of extended studies by both McCloy[2] and Cozens,[3] and the results of their efforts have been used extensively in equating men for physical education activities.

Statement of the Problem

In spite of the wide-spread use made of these particular classification indexes during the period of about two decades since their presentation, the question

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[1] John S. Richards, Physical Education Efficiency Tests for Grade Schools, *American Physical Education Review*, XIX (Dec. 1914), 637–46.

[2] Charles H. McCloy, *Measurement of Athletic Power*. New York: A. S. Barnes and Company, 1932. Pp. vii + 178.

[3] Frederick W. Cozens, *Achievement Scales in Physical Education for College Men*. Philadelphia: Lea and Febiger, 1936. Pp. 118.

of whether they adequately reduce the variability of performance of college men in physical activities has never been determined to the satisfaction of all.

Obviously, these indexes group men in terms of size. Are individuals thus classified also grouped in terms of actual performance? If, as some believe, the variability of performance between two groups is not reduced significantly through the factors of height and weight, the continued use of these elements in classification plans is, of course, a questionable procedure.

The purpose of this paper is to present data concerning the reduction of variability of performance of college men achieved by means of a height-weight classification in an actual physical education situation.

Procedure

During the recent war years various performance tests were given at the University of Michigan in connection with the required physical training program.[4] From some 6,000 pretest (i.e., previous to any conditioning or training) records collected during the academic year 1942–43, 1,559 were selected at random as meeting satisfactory criteria of completeness and legibility, and were grouped in the nine divisions of the Cozens Classification. Each of these records included data on seven test items: pull-ups, push-ups, right grip, vertical jump, quarter-mile run, 60-yard dash, and standing broad jump.

The first step in the analysis of the extent to which the men in this program were classified as to performance was to determine the mean standard score of each classification group for each test.[5] The scores thus secured were then tabulated to compare the ranks of each classification in each test item (see Table 1).

This tabulation indicates that the rank order for each grouping varies with different test item. In other words, if an individual is classified according to performance in a particular event, it does not necessarily follow that he is classified in the same order in performance of a different type. It is significant, in this connection, that of the nine classifications each had at least one ranking of four or better (five groups had a ranking of one), and each had at least one ranking of six or lower (four groups achieved the bottom rank of nine). Each of the five classes that had a rank of one in some event also had at least one item-rank of eight or nine!

Thus, for the particular battery used in this testing program, the height-weight classification proved of little value as a predictor of all-around achievement.

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[4] For a thorough consideration of this testing program see: Byron O. Hughes, "Test Results of the University of Michigan Physical Conditioning Program, June 15–September 26 1942," *Research Quarterly*, XIII (December, 1942), 498–511.

[5] The population standard deviation (σ_p) for each test item was determined as follows:

$$\sigma_p = \frac{(N_1\sigma_1 + N_2\sigma_2 \cdots + N_9\sigma_9)}{(N_1 + N_2 \cdots + N_9)}$$

The reciprocal of this provided a value for one unit of the item in question, and the reciprocal multiplied by the mean of each sub-group gave the mean standard score, i.e.,

$$M \text{ st. sc.} = \frac{1}{\sigma_p} M.$$

TABLE 1

Mean Standard Score Rank of each Classification Group in the Seven Events of the Test Battery

Classification	Pull-up	Push-up	Right Grip	Vertical Jump	Quarter-mile Run	60-yard Dash	Standing Broad Jump
Short-slender	4	5	9	6	8	9	9
Short medium	1	2	8	7	7	2	8
Short-heavy	5	1	4	9	9	7	6
Medium-slender	3	4	7	8	4	3.5	7
Medium-medium	2	3	5	2	5	6	3
Medium-heavy	8	6	2	3	1	1	4
Tall-slender	7	9	6	5	3	3.5	5
Tall-medium	6	8	3	1	2	5	1
Tall-heavy	9	7	1	4	6	8	2

Further analysis was made of the same data in order to determine whether this grouping device was a useful tool in providing significant homogeneity among college men in any one specific skill. Despite the conclusion that Cozens' scheme was of little value in predicting general performance ability with the Michigan battery, an equalizing technique might have a place in the physical education program even though adaptable to only one activity.

This problem was approached from several directions. First, in order to ascertain the actual overlap of performance between the groups in an event, graphs were constructed for each of the seven test items, indicating the range of each classification, the mean of each classification, the population mean, and the range of the middle four population standard deviations. These graphs provided a visual indication of the range of scores shared in common by the nine sub-groups in each test.

The deviation of the classification means from each other is also indicated in the graphs. These variances, however, cannot be interpreted readily from the graphs alone due to a lack of reference. Therefore, in order to determine the actual reduction in variation resulting from the equating scheme used, the deviation of each class mean from the population mean for a particular test item was determined in performance units. These variations were then recorded in terms of population standard deviation units which, in turn, provided information necessary for finding the percentage parts of the total area between the class means and the population mean. The difference between any two adjacent performance classes was then apparent as a percentage figure which indicated reduction in variation among the groups of the population tested.

Pull-ups (see Figure I and Table 2). Of the nine classification groups, only two had means deviating as much as one performance unit from the population mean, and each of these varied less than two units. The middle four population standard deviations were shared in common by all classes. Variability was actually reduced less than 5 percent by all adjacent classes except in two cases.

There was some indication that height-weight factors may be combined satisfactorily in classifying for this event. The three tall, and two of the heavy desig-

TABLE 2

Percentage of Variation Between Adjacent Means, and Standard Error of the Difference Between Adjacent Means, of Cozens Classification Groups in the Pull-up Test

Class	Mean	Percentage of Variation				Standard Error	
		Variation of Mean from Population M	Variation of Mean from Population M in σ Units	Percentage of Area between M and Population M	Percentage of Area between Class Means	Difference between Class Means	Standard Error of Difference between Class Means
Tall-heavy	6.50	1.69	.50	19.15			
Medium-heavy	7.52	.67	.20	7.93	11.22	1.02	.37
Medium-heavy	7.52	.67	.20	7.93			
Tall-slender	7.75	.44	.13	5.17	2.76	.23	.36
Tall-slender	7.75	.44	.13	5.17			
Tall-medium	8.12	.07	.02	.80	4.37	.37	.32
Tall-medium	8.12	.07	.02	.80			
Short-heavy	8.59	.40	.12	4.78	5.58	.47	.33
Short-heavy	8.59	.40	.12	4.78			
Short-slender	8.72	.53	.16	6.36	1.58	.13	.62
Short-slender	8.72	.53	.16	6.36			
Medium-slender	8.86	.67	.20	7.93	1.57	.14	.62
Medium-slender	8.86	.67	.20	7.93			
Medium-medium	9.11	.92	.27	10.64	2.71	.25	.35
Medium-medium	9.11	.92	.27	10.64			
Short-medium	9.48	1.29	.38	14.80	4.16	.37	.39

nations were in the groups with the lowest four means, while two of the short and two of the slender classifications were included in the group with the four highest means.

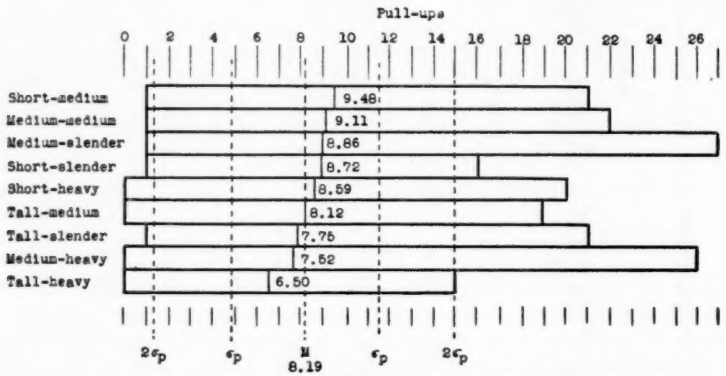

Fig. I.—Range, Means, and Performance Rank of Classification Groups in Pull-up Test.

Push-ups (see Figure II and Table 3). In a population performance range of 55 units, four classes had means which varied .3 of a unit, or less, from the population mean. The other five groups were in two closely centered categories, one of which consisted of three classifications with .79 of a unit separating the means, and the other composed of two classes whose means differed by .01 of a unit. The means of only two groups deviated from an adjacent class by more than 3.44 percent. One of these was a substantial 17.86 percent difference, and the other varied 7.11 percent.

Height appeared to offer the greatest promise as a factor for the classification of this event. The three tall categories provided the lowest three means, while those with the two highest means were both short classifications.

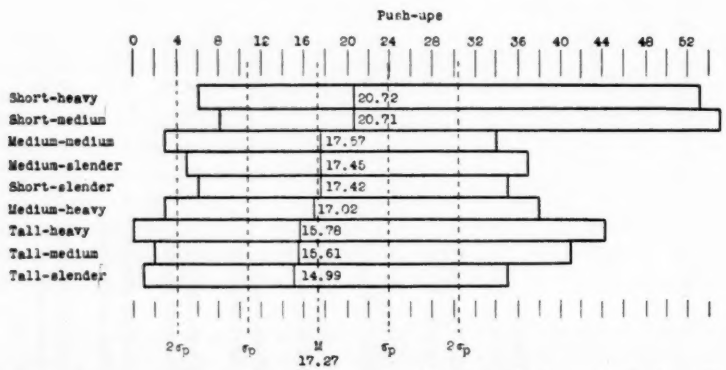

Fig. II.—Range, Means, and Performance Rank of Classification Groups in Push-up Test.

TABLE 3

Percentage of Variation Between Adjacent Means, and Standard Error of the Difference Between Adjacent Means, of Cozens Classification Groups in the Push-up Test

Class	Mean	Percentage of Variation				Standard Error	
		Variation of Mean from Population M	Variation of Mean from Population M in σ Units	Percentage of Area between M and Population M	Percentage of Area between Class Means	Difference between Class Means	Standard Error of Difference between Class Means
Tall-slender	14.99	2.28	.34	13.31			
Tall-medium	15.61	1.66	.25	9.87	3.44	.62	.61
Tall-medium	15.61	1.66	.25	9.87			
Tall-heavy	15.78	1.49	.22	8.71	1.16	.17	.67
Tall-heavy	15.78	1.49	.22	8.71			
Medium-heavy	17.02	.25	.04	1.60	7.11	1.24	.69
Medium-heavy	17.02	.25	.04	1.60			
Short-slender	17.42	.15	.02	.80	2.40	.40	1.19
Short-slender	17.42	.15	.02	.80			
Medium-slender	17.45	.18	.03	1.20	.40	.03	1.17
Medium-slender	17.45	.18	.03	1.20			
Medium-medium	17.57	.30	.05	1.99	.79	.12	.60
Medium-medium	17.57	.30	.05	1.99			
Short-medium	20.71	3.44	.52	19.85	17.86	3.14	.74
Short-medium	20.71	3.44	.52	19.85			
Short-heavy	20.72	3.45	.52	19.85	.00	.01	.87

Right grip (see Figure III and Table 4). In this test item, three of the classes had means which exceeded adjacent means by more than 10 percent.

It appears that a height-weight classification scheme may achieve considerable effectiveness in grouping for this performance. Muscle mass is, of course, an important factor in strength, and in this test the heavy groups had mean ranks of one, two, and four, while the slender categories ranked six, seven, and nine.

Again, however, the middle four population sigmas were shared in common by each sub-group.

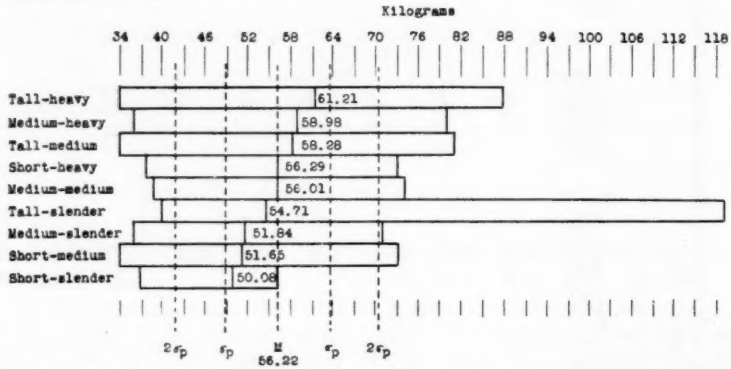

Fig. III.—Range, Means, and Performance Rank of Classification Groups in Right Grip Test.

Vertical jump (see Figure IV and Table 5). Since Sargent originated the test in 1921, the vertical jump has been used as a measure of general athletic po-

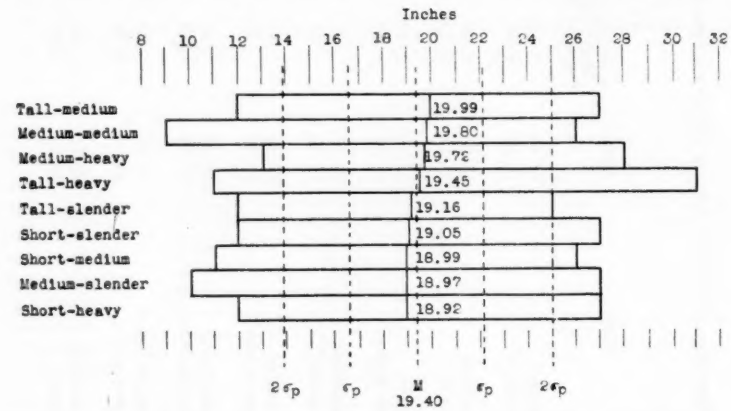

Fig. IV.—Range, Means, and Performance Rank of Classification Groups in Vertical Jump Test.

TABLE 4

Percentage of Variation Between Adjacent Means, and Standard Error of the Difference Between Adjacent Means, of Cozens Classification Groups in the Right Grip Test

Class	Mean	Percentage of Variation				Standard Error	
		Variation of Mean from Population M	Variation of Mean from Population M in σ Units	Percentage of Area between M and Population M	Percentage of Area between Class Means	Difference between Class Means	Standard Error of Difference between Class Means
Short-slender	50.08	6.14	.85	30.23			
Short-medium	51.65	4.57	.64	27.89	2.34	1.57	.95
Short-medium	51.65	4.57	.64	27.89			
Medium-slender	51.84	4.38	.61	22.91	4.98	.19	.72
Medium-slender	51.84	4.38	.61	22.91			
Tall-slender	54.71	1.51	.21	8.32	14.59	2.87	.72
Tall-slender	54.71	1.51	.21	8.32			
Medium-medium	56.01	.21	.03	1.20	7.12	1.30	.74
Medium-medium	56.01	.21	.03	1.20			
Short-heavy	56.29	.07	.01	.40	1.60	.28	.69
Short-heavy	56.29	.07	.01	.40			
Tall-medium	58.28	2.06	.29	11.41	11.01	1.99	.77
Tall-medium	58.28	2.06	.29	11.41			
Medium-heavy	58.98	2.76	.38	14.80	3.39	.70	.77
Medium-heavy	58.98	2.76	.38	14.80			
Tall-heavy	61.21	4.99	.69	25.49	10.69	2.23	.77

TABLE 5

Percentage of Variation Between Adjacent Means, and Standard Error of the Difference Between Adjacent Means, of Cozens Classification Groups in the Vertical Jump Test

Class	Mean	Percentage of Variation				Standard Error	
		Variation of Mean from Population M	Variation of Mean from Population M in σ Units	Percentage of Area between M and Population M	Percentage of Area between Class Means	Difference between Class Means	Standard Error of Difference between Class Means
Short-heavy	18.92	.48	.17	6.75			
Medium-slender	18.97	.43	.15	5.96	.79	.05	.31
Medium-slender	18.97	.43	.15	5.96			
Short-medium	18.99	.41	.15	5.96	.00	.02	.31
Short-medium	18.99	.41	.15	5.96			
Short-slender	19.05	.35	.13	5.17	.79	.06	.59
Short-slender	19.05	.35	.13	5.17			
Tall-slender	19.16	.24	.09	3.59	1.58	.11	.56
Tall-slender	19.16	.24	.09	3.59			
Tall-heavy	19.45	.05	.02	.80	4.39	.29	.27
Tall-heavy	19.45	.05	.02	.80			
Medium-heavy	19.72	.32	.11	4.38	3.58	.27	.28
Medium-heavy	19.72	.32	.11	4.38			
Medium-medium	19.80	.40	.14	5.57	1.19	.08	.27
Medium-medium	19.80	.40	.14	5.57			
Tall-medium	19.99	.59	.21	8.32	2.75	.19	.26

tentiality. It has achieved wide acceptance as a valid test of the combination of strength and speed of muscle contraction which has been defined as athletic power.

Both strength and speed of action in muscle tissue have been isolated as primary factors through factor analysis techniques by McCloy[6] and later investigators. Thus, as would be expected, body size elements have no appreciable effect on performance made up largely of these two orthogonal factors.

The range of the means of the nine classifications was 1.07 inches, with none of the groups deviating more than .59 inches from the population mean. The largest percentage difference between the means of bordering classifications was 4.39 percent, and the performance of all classes overlapped within a range of plus or minus two population standard deviations.

Quarter-mile run (see Figure V and Table 6). The range of the means of the nine classifications covered 4.62 seconds, while the total population performance range was 78 seconds. Only one group deviated from its bordering class by more than 5 percent.

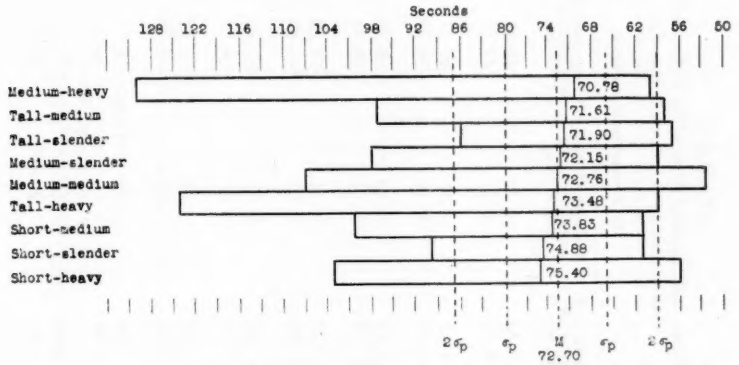

Fig. V.—Range, Means, and Performance Rank of Classification Groups in Quarter-mile Run Test.

60-yard dash (see Figure VI and Table 7). This data provides an excellent indication of the fact that speed is an innate factor not significantly related to body size or build. Six of the nine height-weight groupings had a combined range of .08 seconds between their means, and none of these six deviated more than .04 seconds from the population mean. The range of the means of all nine groups was .18 seconds, with none varying more than .10 seconds from the population mean.

Four-tenths of 1 percent was the greatest difference in reduction of variability between adjacent classification groups.

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[6] C. H. McCloy, The Measurement of General Moror Capacity and General Motor Ability, *Supplement to the Research Quarterly*, V (March 1934), 46–61.

TABLE 6

Percentage of Variation Between Adjacent Means, and Standard Error of the Difference Between Adjacent Means, of Cozens Classification Groups in the Quarter-mile Run Test

Class	Mean	Percentage of Variation				Standard Error	
		Variation of Mean from Population M	Variation of Mean from Population M in σ Units	Percentage of Area between M and Population M	Percentage of Area between Class Means	Difference between Class Means	Standard Error of Difference between Class Means
Short-heavy	75.40	2.70	.39	15.17			
Short-slender	74.88	2.18	.31	12.17	3.00	.52	1.30
Short-slender	74.88	2.18	.31	12.17			
Short-medium	73.83	1.13	.16	6.36	5.81	1.05	1.29
Short-medium	73.83	1.13	.16	6.36			
Tall-heavy	73.48	.78	.11	4.38	1.98	.35	.79
Tall-heavy	73.48	.78	.11	4.38			
Medium-medium	72.76	.06	.01	.40	3.98	.72	.72
Medium-medium	72.76	.06	.01	.40			
Medium-slender	72.15	.55	.08	3.19	3.59	.61	.66
Medium-slender	72.15	.55	.08	3.19			
Tall-slender	71.90	.80	.12	4.78	1.59	.25	.59
Tall-slender	71.90	.80	.12	4.78			
Tall-medium	71.61	1.09	.16	6.36	1.58	.29	.57
Tall-medium	71.61	1.09	.16	6.36			
Medium-heavy	70.78	1.92	.27	10.64	4.28	.83	.77

TABLE 7

Percentage of Variation Between Adjacent Means, and Standard Error of the Difference Between Adjacent Means, of Cozens Classification Groups in the 60-yard Dash Test

Class	Mean	Percentage of Variation				Standard Error	
		Variation of Mean from Population M	Variation of Mean from Population M in σ Units	Percentage of Area between M and Population M	Percentage of Area between Class Means	Difference between Class Means	Standard Error of Difference between Class Means
Short-slender	8.14	.10	.02	.80			
Tall-heavy	8.10	.06	.01	.40	.40	.04	.11
Tall-heavy	8.10	.06	.01	.40			
Short-heavy	8.08	.04	.01	.40	.00	.02	.06
Short-heavy	8.08	.04	.01	.40			
Medium-medium	8.06	.02	.00	.00	.40	.02	.05
Medium-medium	8.06	.02	.00	.00			
Tall-medium	8.03	.01	.00	.00	.00	.03	.04
Tall-medium	8.03	.01	.00	.00			
Medium-slender	8.02	.02	.00	.00	.00	.01	.05
Medium-slender	8.02	.02	.00	.00			
Tall-slender	8.02	.02	.00	.00	.00	.00	.06
Tall-slender	8.02	.02	.00	.00			
Short-medium	8.00	.04	.01	.40	.40	.02	.06
Short-medium	8.00	.04	.01	.40			
Medium-heavy	7.96	.08	.02	.80	.40	.04	.06

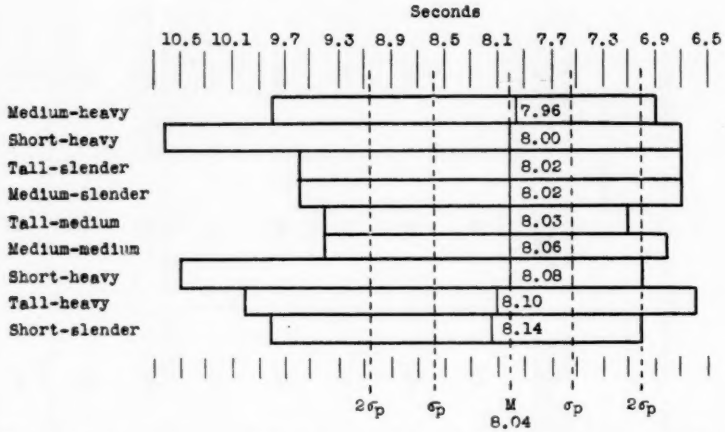

Fig. VI.—Range, Means, and Performance Rank of Classification Groups in 60-yard Dash Test.

Standing broad jump (see Figure VII and Table 8). This test item is considered by some physical educators to be a satisfactory substitute for the vertical jump. Such an observation appears logical, but on the basis of the limited evidence presented here this would not seem to be the case. There was a range of means of 8.54 inches, and four classifications deviated more than 5 percent from adjacent groups. The means of four successively ranked classes had a total range of only .73 inches, but aside from this centralization a height-weight grouping technique seems adaptable to the standing broad jump event.

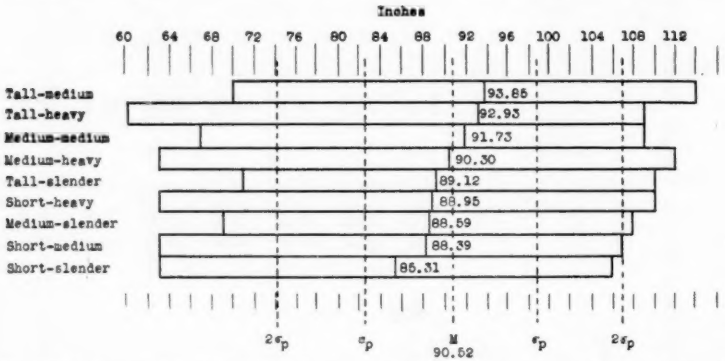

Fig. VII.—Range, Means, and Performance Rank of Classification Groups in Standing Broad Jump Test.

At this point in the investigation, a pertinent question arose as to whether or not the slight variations in performance indicated between classes in the various test items were significant differences. The apparent conclusion to be drawn from the graphical analysis to the effect that the differences had little significance was not strictly warranted, and in order to further study this issue, the

TABLE 8

Percentage of Variation Between Adjacent Means, and Standard Error of the Difference Between Adjacent Means, of Cozens Classification Groups in the Standing Broad Jump Test.

Class	Mean	Percentage of Variation				Standard Error	
		Variation of Mean from Population M	Variation of Mean from Population M in σ Units	Percentage of Area between M and Population M	Percentage of Area between Class Means	Difference between Class Means	Standard Error of Difference between Class Means
Short-slender	85.31	5.21	.64	27.89			
Short-medium	88.39	2.13	.26	10.26	17.63	3.08	1.73
Short-medium	88.39	2.13	.26	10.26			
Medium-slender	88.59	1.93	.24	9.48	.78	.20	.86
Medium-slender	88.59	1.93	.24	9.48			
Short-heavy	88.95	1.57	.19	7.53	1.95	.36	.82
Short-heavy	88.95	1.57	.19	7.53			
Tall-slender	89.12	1.40	.17	6.75	.78	.17	.82
Tall-slender	89.12	1.40	.17	6.75			
Medium-heavy	90.30	.22	.03	1.20	5.55	1.18	.86
Medium-heavy	90.30	.22	.03	1.20			
Medium-medium	91.73	1.21	.15	5.96	7.16	1.43	.87
Medium-medium	91.73	1.21	.15	5.96			
Tall-heavy	92.93	2.41	.30	11.79	5.83	1.20	.80
Tall-heavy	92.93	2.41	.30	11.79			
Tall-medium	93.85	3.33	.41	15.91	4.12	.92	.81

reliability of the differences between adjacent class means in each of the seven test items was determined by computing the standard errors of their differences.

These calculations demonstrated that the variations between one pair of bordering means in the pull-up test and two pairs in the right grip test were significant. The differences between the other 53 pairs of adjacent means proved to be nonsignificant (see Tables 2–8).

Summary

Several observations seem applicable:

1. The Cozens classification scheme—a plan based on height-weight factors—provides a satisfactory equating device for grouping college men according to body size.

2. The classifier was of no particular value in predicting all-around performance in a seven-item test battery consisting of pull-ups, push-ups, right grip, vertical jump, quarter-mile run, 60-yard dash, and standing broad jump.

3. When the test items were considered separately through the use of a graphic device, performance classification was indicated, but this characteristic, in general, was limited. A variation of over 15 percent was shown between bordering class means in only two cases. Except in three isolated instances, the obtained differences between means were disclosed as unreliable values.

4. There was considerable overlap of performance between classes. A large proportion of the range of scores in all events were shared by all classes.

5. Of general interest was the observation that little variation was shown between classifications in events such as the vertical jump and the 60-yard dash which are believed to be dependent upon innate factors uninfluenced by body size or structure, while a relatively large variation was apparent in the strength of grip test in which muscle mass plays an important role.

In conclusion, as far as general physical performance is concerned, it seems that height and weight are unsatisfactory elements upon which to base a classification of college men. Such grouping may classify in a limited degree for specific events, but it should be evident that a performance test of the particular event in question will provide a highly reliable classification in a simpler and more effective manner.

In 1941 Cureton indicated that combinations of age, height, and weight are not too satisfactory as bases for norming athletic performance above seventeen years of age. In this connection he wrote:

> Other factors are of much greater significance, such as, the quality of muscle tissue, specfiic neuro-muscular learning, internal leverage arrangements, experience, and other types of physical adaptations required by the particular activity.[7]

Perhaps here is the suggestion that will lead some student to a valuable contribution to physical education. Continued research into these and related factors may well point out a sound, acceptable means of rapidly classifying college men into homogeneous performance groups. Such a tool would be an invaluable aid to more effective teaching.

[7] Thomas K. Cureton, Jr., Body Build as a Framework of Reference for Interpreting Physical Fitness and Athletic Performance, *Supplement to the Research Quarterly*, XII (May 1941), 314.

An Analysis of the Factors Affecting the Achievement of Undergraduate Men Majoring in Physical Education at the State University of Iowa

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THE PURPOSE of this study is to determine the factors which cause under graduate men majoring in physical education at the State University of Iowa to succeed or fail in their work, and to recommend on the basis of these factors definite criteria for predicting success in this field of teaching.

According to Appleton (1), cadets at West Point demonstrated a tendency to improve in physical condition throughout the four-year course, but experienced diminishing returns after the first year's improvement. Few cadets changed their class rank in physical ability throughout the four-year course, indicating that relative physical ability had a tendency to remain constant among the cadets at West Point. Physical ability tests at entrance correlated .7 with final tests. This correlation was significant to the 1 per cent level of confidence, and therefore was used as a device for predicting relative physical ability. The seventh percentile in physical ability at entrance is a success-fail criterion significant for predicting graduation.

Ashbrook (2) concluded, from his study of selection methods in general education and physical education in teacher training institutions and from the educational histories and judgments of foremost leaders in physical education and selected Springfield College graduates, that all prospective physical education majors, as Freshmen, should be required to: present a high school diploma requiring sixteen units, with a C average in high school or college if a transfer student; submit to an examination in the key subjects of English and Physical Education; submit to a physical and medical examination administered at the institution by the school physician; submit to personal interview; present evidence of professional interest; meet standards of appearance and character; present recommendations from principal and physical educational director; submit to intelligence and achievement tests; and serve a probationary period.

In the opinion of Cubberly (3), criteria for selection should be: personality—Bernreuter Personality Inventory; intelligence and special aptitudes—Stanford Education Aptitude Tests; academic achievement—evaluation of institutional standards; interest in teaching—strong vocational interest and cumulative records of pre-college activities. Competence in oral and written English,

[1] This study is based on a dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in The Division of Physical Education, Graduate School, University of Iowa.

skills in physical activities, and co-operation with individuals and groups are other criteria which should be determined by records and tests.

Davis and Lawther (4) concluded that the most important factor in getting and holding a job is personality, which is measured by the impression one's behavior makes on other people. A maladjusted person is one who cannot get along with others. Studies in teacher failure list inability to discipline and inadequate personality as major causes. Research indicates that success is associated with the following factors: professional interest, academic record, extracurricular experiences, personal qualities, and professional attitude.

One of the difficult problems in training teachers, according to LaPorte, (6) is estimating the worth of each student. A frank character analysis is also needed. Permanent records can be established by the use of charts with periodic entries made each semester by each member of the department. The effect is to eliminate bias of one teacher and to stimulate both students and staff members to the importance of the problem. Main headings are: physical, mental, social, educational, technical skill, teaching power, leadership, responsibility, character, and general worth, with sub-headings under each and ratings graduated from superior to unsatisfactory. Ratings can be used for guidance and placement without exorbitant amounts of book work required.

McCloy (7) proposes that tests intelligently administered may measure innate capacity and ability of students and may be used for classification. After the student is classified, further use of tests may be made to measure progress, to motivate participation through the use of a marking system, and to determine advancement. Tests may also be used to diagnose pupil difficulties and as a basis for individual and remedial instruction. Tests are reliable checks on teaching ability and program efficiency. Administrators may wish to use testing results as a basis for effecting changes in either personnel or programs. Only if tests meet the requirements of objectivity, reliability, validity, and simplicity can they be justified in the program.

The Questionnaire Study

The questionnaire study was designed to determine the reasons that motivated present undergraduate majors to choose physical education as a major field of study (see Figure I), and why those who withdrew or transferred to other departments did so. It also attempted to determine the reasons why graduates in physical education elected this field of study, why they completed their degrees and accepted employment in the field, and why some of them left the field after completing their degrees. Primary and secondary reasons were requested.

Questionnaires were tabulated and percentages computed for each desirable reason given for electing physical education as a major. A comparison was made (Figure III) between the withdrawal group and the average of all continuing groups, which showed that a greater percentage of the continuing students had desirable reasons than did the withdrawal group. This difference is significant to the 1 percent level of confidence.

Iowa revision of the Brace Test:

Questionnaire to Undergraduate Majors and Graduates in Physical Education

Dear Sir:

In order to determine the reasons students elect Physical Education as a major field of study, it is requested that each student or graduate who is majoring or has majored in Physical Education, indicate with a check (x) the reasons for making this choice for his profession.

Reasons	Primary	Secondary
1. Teacher shortage—Demand for teachers was great when you entered college.		
2. Interest—Desire to teach and/or coach physical activities.		
3. Challenge—Dissatisfied with the high school program of P.E. where you attended.		
4. Competence—Accomplished more in Physical Education than in any other dept.		
5. Influence of high school coach or teacher.		
6. Influence of family.		
7. Influence of another student or students.		
8. Influence of reading books, magazines, or newspapers.		
9. Influence of a person not listed above.		
10. Influence of a related experience in service or in another job.		
11. Easy courses—You thought it would be easier than other courses at SUI.		
12. To be exempt from the language requirement (before 1945).		
13. More opportunities for recreation than other fields.		
14. Other reasons. List.		

Fig. I. Form Used in Questionnaire I

The Somatotype Study

Ratings were estimated for each subject only after intensive review of the literature relating to rating procedures and approximately five hours of practice until independent ratings on each subject correlated .95 with each other. The final ratings were approved by Professor F. D. Sills, the instructor in charge of the photographic laboratory. Fractional ratings were found to facilitate more accurate estimates and were therefore utilized in the study.

Rating Scale for Withdrawal Students who Majored in Physical Education

Dear Sir:

In attempting to predict the prospective degree of success or failure in the Professional Curriculum of Physical Education at the State University of Iowa, it is necessary to secure subjective ratings from each faculty advisor to whom each withdrawn student has been assigned. Would you kindly check the column that most accurately describes the qualifications of as you remember him.

Qualifications	Upper 10%	Upper 30%	Upper 50%	Lower 30%	Lowest 10%
Social leadership—takes initiative, poised, responsible.					
Adaptability—resourceful, sociable, co-operative, versatile.					
Character—is dependable, moral, ethical, trustworthy, clean.					
Physical soundness and vitality. List handicaps if any.					
Cultural development and breadth of experience.					
Interest in welfare of students.					
Interest in teaching and coaching as a profession.					
Emotional stability—is persistent, even tempered, not impulsive.					
Physical skills and abilities as demonstrated by athletic achievement and recognition.					
Motivation and will to succeed.					
Economic means—Sufficient funds for completion of the 4-yr. course.					
Probability of success in this curriculum.					

Fig. II. Form used in Advisors' Rating Study

The Modified Motor Quotient and Modified Motor Achievement Test Study

The computation of indices indicative of motor educability was undertaken for its importance as a predictor of success in motor skills. A battery of 17 tests (see Appendix) was constructed, including:

1. One foot, touch head
2. Grapevine (5 seconds)
3. Stork stand (10 seconds)

4. Forward hand kick
5. Three dips
6. Side kick
7. Kneel jump to feet
8. Russian dance
9. Single squat balance (5 seconds)
10. Jump foot

plus:

11. Burpee (10 seconds)
12. Chalk jump (centimeters)
13. Modified Edgren wall bounce test (30 secs.)
14. Sit ups (2 minutes)
15. Chins (underhand)
16. 100 yd. Pick-a-back
17. 300 yd. shuttle run

In order to facilitate the procedure and standardize the technique of body typing, photographs of front view, profile, and rear view were taken of the 34 Freshmen,[2] 26 Juniors, and 27 Seniors majoring in physical education. These were printed on regular five by seven photographic paper. Pictures were also from the files of 14 students who have withdrawn or transferred from physical education since 1947. These photographs were used in the study although none of this group of subjects was available for girth measurements. In addition to the photographs, measurements were taken of the girths of the neck, chest, arm, forearm, thigh and calf, as well as height and weight for each subject, in order to be able to compute more accurate somatotype ratings. Measurements were made in compliance with international agreements (5) in regard to landmarks and techniques used.

Somatotype ratings were based on the 7-point scale for each of the three components devised by Sheldon (8), for the degree of endomorphy (soft, roundness), mesomorphy (bony, muscularity), and ectomorphy (linearity), possessed by each subject. For example, a 253 rating would indicate a two rating on the endomorphy scale, a five rating on the mesomorphy scale, and a three rating on the ectomorphy scale. Obviously every subject is a combination of the three types.

Items 1–10, plus 11 and 12 and the classification index were combined to obtain the modified general motor capacity score, and the modified motor quotient. Items 14, 15, 16, and 17 comprise the modified motor achievement test. Item 13 was scored separately and was not computed as part of the motor quotient or motor achievement test battery.

The Modified Motor Quotient was determined by dividing the totals of the conversion scores for the classification index, the chalk jump,[3] Burpee test, and Iowa Brace test by the norms for Modified General Motor Capacity (7).

[2] Due to the unusual number of withdrawals to military service at mid-year 1950–51 among the sophomore class before the data was completed, somatotypes, biographical inventory, and advisors ratings were not available for this group.

[3] Since the chalk jump was substituted for the Sargent jump, the validities of the general motor capacity score (as modified) and for the resulting modified motor quotient are undoubtedly lowered to a significant extent; hence, conclusions concerning the usefulness of the general motor capacity tests, as administered according to McCloy's specifications, as applied to this problem, should be held in abeyance.

The average *T*-score of the test battery was determined by dividing the modified general motor ability *T*-scored total by the number of tests (4). The modified general motor ability test consisted of sit-ups, pull-ups, the 100-yard pick-a-back, and the 300-yard shuttlerun.

Entrance Examination Scores

Entrance examination scores were made available from the office of the University Examination Service. Since these examinations had been administered for several years, the records for the Freshmen, Sophomores, Juniors, Seniors, and withdrawals from physical education since the entrance of the present Senior class in 1947, were used in the study.

The examinations consist of six parts, including English placement, reading comprehension, mathematics skills, reading rate, expository theme, and persuasive speech. Students who failed to complete the entire tests were not scored. A number of scores were also available for students transferring to the state University of Iowa as physical education majors with advanced standing.

The Biographical Inventory

The biographical inventory is a modified version of the Minnesota multiphasic test using only the most valid items as determined by the item analysis technique. The test was administered to 36 Freshmen, 19 Juniors, and 26 Seniors majoring in physical education, with permission of Dr. Harold Bechtoldt of the State University of Iowa department of psychology, who had previously done the revision work on this test. Scores were also available for six students who had withdrawn from physical education since entrance in 1947.

The *L* scale of 15 items is assumed to measure lying in a socially desirable direction. The *K* scale of 30 items is assumed to measure defensive lying, and self-deceptive test-taking attitudes. The *F* scale of 63 items is assumed to measure the tendency to give "abnormal" responses (i.e., responses which are given by only 10 per cent of the population) because of confusion, semantic difficulty, "plus-getting" tendency, random responses, or schizoid characteristics. The *A* scale is assumed to measure anxiety, and the *R* scale is assumed to measure rigidity.

Grade Point Averages

Grade point averages were made available from the office of the registrar for the Freshmen, Sophomores, Juniors, Seniors, withdrawals, and transfers who have majored in physical education since their entrance to the State University of Iowa since 1947. High school grade point averages were used for the nine Freshmen who withdrew before receiving their grades for the first semester, 1950–51.

Advisors' Ratings

The faculty advisors for the Freshman and Junior classes were requested to rate each Freshman and Junior according to the criteria shown in Figure II, on the basis of the category achieved within the group for each criteria. A

composite score was computed for each subject, based on a scale of 9—excellent, 7—good, 5—average, 3—poor, 1—very poor, and the mean score was determined for each group. The Senior group was rated by the supervisor of student teaching according to the same criteria as those used for the Freshman and Junior ratings, with the exception that the criterion "teaching techniques," was substituted for "economic means," in the Senior ratings. All other criteria were the same for each group for purposes of comparison. The withdrawal group was rated by the advisor assigned to the class of entering Freshmen to which each subject originally belonged.

Use of the Data

A comparison was made, for each evaluative measure, of the means obtained from the withdrawal group and an average of the means obtained from all groups that are continuing as majors in physical education. This comparison was intended to show which group was relatively most successful in the traits and abilities measured by these devices, and to identify comparative strengths and weaknesses in aptitude and achievement.

A comparison was also made for each measure, of the means obtained for the Freshman, Junior and Senior groups. This comparison was intended for use as a basis for prediction of probable success for the Freshmen, since the Seniors have virtually achieved the criterion of success, which is designated as graduation from the four-year major in physical education. The latter comparison was also intended to point out the progress made by the Junior and Senior group as compared to the Freshman scores.

A third comparison was made between the graduate group and each other group on the questionnaire, entrance examination, grade-point averages and advisors' ratings. Records of this group were used as a criterion of success in physical education, since it included only those who attained a 2.00 grade-point average which qualified them for admission to education courses and practice teaching.

Conclusions

Figure III illustrates the comparison between the withdrawal group means and the average of all other groups in the seven evaluative measures used in this study. Figure IV illustrates the comparison between the Freshman, Junior, Senior, and graduate group means in each measure. In five of the evaluative measures, a significant superiority is evidenced in favor of the continuing groups over the withdrawal groups. The evidence contained in this study was that:

1. A greater percentage of students who are continuing as majors in physical education at the State University of Iowa have entered the field with professional attitudes than did those who have withdrawn or transferred from the department. A greater percentage of Junior majors have entered the field with professional attitudes than did the Freshman, Senior, or graduate majors.

2. Students who are continuing as majors in physical education at the State University of Iowa have an average of slightly lower ratings on the endomorphic scale, which may be an asset in participation in strength and endurance ac-

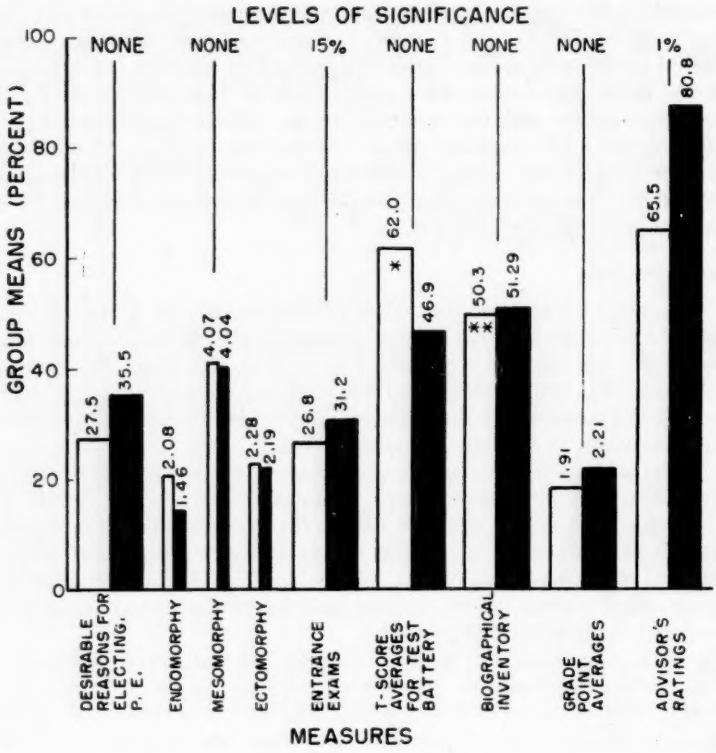

FIG. III COMPARISON OF MEANS FOR WITHDRAWAL GROUP ☐ AND AVERAGE OF MEANS FOR ALL OTHER GROUPS ■ IN THE SEVEN EVALUATIVE MEASURES USED IN THE STUDY.
* THREE SUBJECTS.
** SIX SUBJECTS.

tivities. Freshman majors have an average of significantly lower endomorphic ratings than the Senior majors and slightly lower than the Juniors. All group means were approximately the same on the ectomorphic and mesomorphic scales.

3. Students who are continuing as majors in physical education at the State University of Iowa have averaged higher scores on their entrance examinations, and have therefore probably experienced less difficulties in the subject matter of their curriculum requirements. Withdrawals from each entering Freshman class since 1947 have averaged significantly lower than the survivors of their respective classes. Junior majors have averaged higher scores on the entrance examinations than the Freshmen and Seniors, though the graduates have scored significantly higher than any other group.

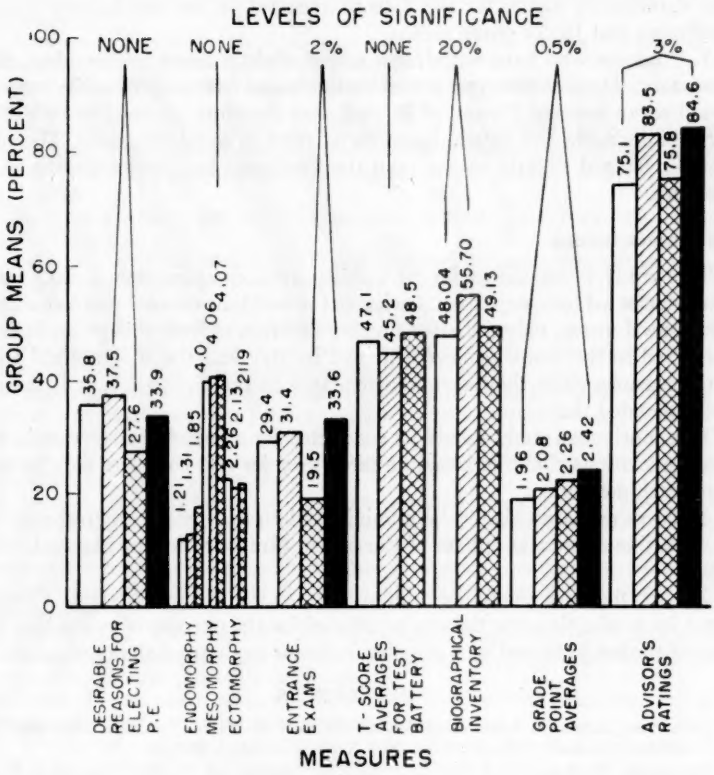

FIG. IV COMPARISON OF MEANS FOR THE FRESHMAN □, JUNIOR ▨, SENIOR ▩, AND GRADUATE ■, IN THE SEVEN EVALUATIVE MEASURES USED IN THE STUDY.

4. Students who are continuing have achieved higher academic scholarship than those who have withdrawn. Withdrawals from each entering Freshman class since 1947 have averaged significantly lower than the survivors of their respective classes. The Senior group averaged slightly higher grade points than the Freshman and Junior groups, and the graduate group averaged significantly higher than any other group.

5. Students who are continuing have received higher ratings by their advisors on personality and character traits than those who have withdrawn. The graduate group averaged significantly higher than any other group.

6. There were insufficient data available for a valid comparison of the *T*-score averages of the test battery for the withdrawal group. These scores represented measures of strength and endurance. The Senior group mean was slightly but

not significantly higher for the *T*-score averages on the test battery than the Freshman and Junior group means.

7. Students who have withdrawn scored slightly lower on the biographical inventory. These scores represented desirable and normal personality responses based on an average *T*-score of 50, and were therefore assumed to be valid indices of desirable and normal behavior patterns in social situations. The Junior group averaged slightly higher than the Freshman and Senior groups on this measure.

Recommendations

This study is dependent for its validity upon completeness of data for the groups selected for comparison. Owing to the fact that contact was lost with the withdrawal group, only a limited number of subjects from this group had been subjected to the motor achievement test battery and the Biographical Inventory measures while they were in attendance at the University. It is therefore recommended that:

1. A continuous study should be conducted for a period of five years in order that conclusions could be based on large samples and complete data obtained from each measure.

2. These measures should be administered to each entering Freshman class as a routine orientation phase of the course "Introduction to Physical Education."

3. Each measure should be administered to the Senior classes as a requirement for graduation, the data to be utilized for the purpose of evaluating progress of the subjects and as a possible basis for evaluating the curriculum.

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APPENDIX

A description of the battery of 17 tests used in the study is given below:

1. *One foot, touch head*—Stand on one foot, bend forward and place both hands and the head on the floor. Regain standing position without losing balance.

2. *Grapevine (5 seconds)*—Stand with heels together. Bend down with arms between

knees, behind ankles, and hold fingers together in front of ankles for five seconds without losing balance.

3. *Stork stand (10 seconds)*—Hold the bottom of the right foot against the inside of the left knee. Close eyes and hold position for ten seconds.

4. *Forward hand kick*—Jump upward, swinging legs forward. Touch toes with hands before landing.

5. *Three dips*—Place hands on the floor with arms straight, extend feet back until the body is straight. Bend arms and touch chest to floor and return to straight arm position three times.

6. *Side kick*—Jump upward and touch feet together outside the line of the body, land with feet apart.

7. *Kneel, jump to feet*—Kneel on both knees, toes extended behind. Jump to feet without losing the balance.

8. *Russian dance*—Squat with one leg extended forward. Alternate this position with the opposite leg forward. Each foot should assume the forward position twice.

9. *Single squat balance (5 seconds)*—Squat on one heel, extend the other foot forward without touching it to floor. Hold the position for five seconds.

10. *Jump foot*—Hold the toes of one foot in the opposite hand. Jump up and place the free foot over the foot that is being held without letting it go.

11. *The burpee test*—Consists of a squat, followed by thrusting feet to the rear, then returning to a squat from an erect starting position, scored in fractions, as many times as it can be executed in ten seconds.

12. *The chalk jump*—Is a measurement of the distance in centimeters between the subject's reach and his best jump of three trials.

13. *Modified Edgen wall bounce test*—Bounce a basketball against the wall from behind an eight foot restraining line as many times as possible in thirty seconds. Parallel lines are drawn on the wall 3 feet apart and on the floor at right angles to the wall 6 feet apart. The subject should stand outside the parallel lines on the floor, alternating from the right to the left side and throw outside the parallel lines on the wall, alternating from the right to the left side after each throw.

14. *Sit ups*—Lie in a supine position with hands clasped behind the head. Sit up and touch one elbow to the opposite knee and return to a lying position, alternating from right elbow to left, as many times as possible in two minutes.

15. *Chins*—From a hanging position on a horizontal bar with underhand grip, pull up to a chinning position and return as many times as possible.

16. *One-hundred yard pick-a-back*—Choose a man within ten pounds of your own weight and carry him one hundred yards on your back as fast as possible.

17. *Three-hundred yard shuttle run*—Run the sixty yard distance five times, as fast as possible.

Continued from the October Quarterly

Research Abstracts

Prepared by the Research Abstracts Committee of the National Council of the Research Section, Paul A. Hunsicker, Chairman

Anatomy and Physiology

62. NEWMAN, P. H., Sprung Back, *J. of Bone and Joint Surg.*, 34-B No. 1 (British Vol. 30–37. Feb. 1952).

The patient is usually fifteen to thirty-five and more commonly a female. There is pain in the buttocks, back of the thighs and occasionally extends down the limbs. The onset may be associated with a blow or fall, a strain while lifting, violent activity in adolescence or childbirth; but sometimes the cause can not be determined. The ache is frequently worse when the spine is flexed and is subjected to strain or held in the same position for a long time. Common causes of the "sprung back" include (1) sitting in slouched position with lower back unsupported, (2) lifting a weight at arms length, (3) bending and stooping, especially with knees straight, and (4) standing with a slight forward stoop (washing and ironing) for a long time. The author found that about 20 per cent of all cases in a backache clinic with which he was associated last year could be classified as the "sprung back" type. Injury to the supporting ligaments of the spine when the spine is flexed and the muscles are relaxed is the cause of this type of backache.—*F. D. Sills*

63. ASMUSSEN, ERLING AND MARIUS BIELSEN. The arterial blood pressure on transition from rest to work. *Acta Physiologica Scandinavica*, Vol. 25, Supplementum 89.5, Aug. 1951.

Direct, continuous measurements of blood pressure were registered during the transition from rest to work on the bicycle ergometer. Work intensities up to 1028 kgm/min. were tested.

Pulse rate increased immediately at the onset of work. Systolic and diastolic as well as mean blood pressure showed after a short delay an increase, which gradually brought the arterial pressure up to the steady state values.

It was concluded that the increased circulation during work is not initiated through pressoreflexes.—*Paul Hunsicker.*

Health

64. LEVY, ROBERT L., Needless restriction in cardiac cases. *Modern Medicine*, **20:** 16, 71–72, Aug. 15, 1952.

Many physicians are too strict in limiting the diet and the physical activities of their heart patients. The neurosis induced by unjustified limitations may be more disabling than the original disorder. Smoking in moderation may be permitted to the majority of patients with inactive forms of heart disease. Tobacco smoke produces relatively little change in the cardiovascular system. Smoking is forbidden in cases of active rheumatic carditis, acute myocardial infarction or congestive heart failure. Climbing stairs does not greatly increase the work of the heart when done at a lesiurely agreeable pace. Air travel for the majority of cardiac patients does not entail undue risk. Patients with coronary heart disease and anginal pain tolerate moderate hypoxia without demonstrable harm or discomfort. Flying should be avoided in congestive failure or evidence of significantly diminished cardiac reserve, active rheumatic carditis, myocardial infarction during the preceding three months, or frequent anginal pain. Except for active rheumatic carditis, chronic congestive heart failure, or intractable angina pectoris, most patients with heart disease are able to work. Before drastically curtailing customary exercise the patient should be permitted to assess his capabilities and the effects of physical exertion. Golf, shooting, fishing, riding, swimming and even tennis may be permitted. School children and young adults with rheumatic heart disease should not participate in highly competitive sports and games. The electrocardiogram should not be the sole guide for management since pronounced abnormalities are often consistent with a normal way of life. The diagnosis of heart disease, once implanted in the mind, is difficult to uproot, even though later proved false.—*F. D. Sills.*

65. McGovern, Joseph M. and Associates, Aureomycin in the treatment of influenzal meningitis, *Clinical Proceedings of the Children's Hospital*, Washington, D. C., April 1952, p. 69.

Increasing frequency of influenzal meningitis and improved results with newer forms of therapy motivated and authors to report on a comparison of treatment in 54 consecutive cases over a three-year period. Of the total, 30 patients with H. influenzae type B meningitis were given various combinations of sulfadiazine, streptomycin, and type specific (rabbit) antiserum. A comparable group of 24 patients received various combinations of sulfadiazine, streptomycin, and type specific antiserum, but in this group aureomycin was added. In both groups mortality was 12 per cent, but the authors report that in the aureomycin-treated group, clinical response was more rapid and complete and there were fewer complications.—*Medical Abstract Service.*

66. Schopp, Alvin; Fellhauer, Carl M.; and Eigel, Edwin G., Preliminary observations of a new drug in the treatment of acute poliomyelitis, *Medical Bulletin*, St. Louis University, Jan. 1952, p. 6.

The use of Pyromen (Tavemol Laboratories) in 53 cases of acute poliomyelitis found clinical results sufficiently encouraging to warrant continued investigation. The authors believe that results of this preliminary study indicate that the use of the drug may afford relief from spasticity and exert an influence on the course of bulbar and encephalitic poliomyelitis. One of the most constant effects of Pyromen was relief of spasm and pain due to spasm. Patients admitted with inability to move the neck or sit up, and with severe pain in the extremities experienced relief within one to three days after initiation of therapy.—*Medical Abstract Service.*

Nutrition

67. Brewer, W. D.; Cederquist, D. C.; Williams, B.; Beegle, R. M.; Dunsing, D.; Kelley, A. L.; and Ohlson, M. A., Weight reduction on low-fat and low-carbohydrate diets, *Jr. American Dietetic Association*, Vol. 28, No. 3, pp. 213–217 (March, 1951).

In the first series of the experiment, four over-weight college women were given a weight-reducing diet which supplied an average of 1200 calories, 10.5 gm. nitrogen, and 22 gm. fat per day. In the second series, ten over-weight college women were given a diet which supplied an average of 1500 calories, 16.2 gm. nitrogen, and 90 gm. fat per day. The customary food intake was studied for all subjects for a two-week period preceding weight reduction. All foods eaten were weighed.

The mean nitrogen retentions for subjects on the low-fat diet ranged from 0.21 to 2.84 gm. per day; the mean nitrogen retentions for subjects on the low-carbohydrate diet ranged from −0.74 to 1.29 gm. per day. Average calcium retentions for subjects in Series II varied from −0.17 to 0.06 gm. calcium per day at an average intake of 0.86 gm. per day. The nitrogen retentions were positive for two subjects who maintained their desired weight for thirteen weeks following weight reduction.—*Carolyn W. Bookwalter.*

68. Scheif, Harold Edward; Andrews, Mona Marquette; and Schweigert, Bernard Sylvester, Comparison of methods for determination of the vitamin B_{12} potency of meats, *J. Nutrition*, V. 47, No. 4, (Aug. 1952).

Studies on the rat growth, liver storage and microbiological methods of analysis for vitamin B_{12} in meats have been conducted. The results obtained for the rat assay and microbiological assay were in good agreement for beef and pork muscle cuts, but the results by the rat growth and liver storage assay were considered higher for lamb leg, beef liver and beef kidney. Beef liver was found to contain 20 to 50 times and beef kidney 10 times as much vitamin B_{12} as muscle cuts. Preliminary studies indicate that over 70 per cent of the vitamin B_{12} is retained during cooking of pork, beef, and lamb cuts. Limitations of the animal and microbiological methods for analysis for vitamin B_{12} are discussed.—*The Wistar Institute.*

Recreation

69. Anderson, Jackson M. Do Some Activities Cost Too Much? *Quarterly Bulletin of the American Recreation Society*, **4:** 1: 14–15 (May 1952).

A questionnaire was sent to twenty-five member companies of the National Industrial Recreation Association. This questionnaire requested information concerning the costs of the following ten employee recreation activities: softball, bowling, golf, horseshoes, picnics, camera club, Christmas party, organized card tourney, chorus, and employee shows. Each team activity was divided into two categories, "interdepartmental" and "varsity". Each company was asked to show the following annual costs paid out of the Recreation Fund for each of the ten activities: entry fees, facility costs, leadership costs, expenditures for equipment and supplies, uniform costs, transportation expenses, cost of trophies, expenditures for award banquets, and any other costs.

One of the most interesting findings of this study was the heavy cost of "varsity" team activities when compared with the cost of "interdepartmental" activities. Employee shows were the most expensive activities, costing an average of $1.36 per hour for each participating employee. However, the total number of spectators attending these shows in the companies studied averaged 3,333 per year. The least expensive of the ten activities studied was camera club, costing only 2 cents per hour for each participating employee. The wide range in the costs of certain activities studied indicated that many companies are paying too much money for some recreation activities.—*Jackson M. Anderson.*

70. FITZGERALD, GERALD B., AND MARY ELLEN EVANS. Supply and Placement of College Recreation Graduates. *Quarterly Bulletin of the American Recreation Society.* **4:** 1: 9–11, 24 (May 1952).

The study included reports from 42 colleges and universities. These institutions represented 81% of those offering recreation degrees in 1950–51. Nineteen (45%) of the reporting institutions offered graduate degrees in recreation, enrolling a total of 290 graduate students in this field. The total enrollment of undergraduate and graduate recreation majors was 1,527. Undergraduate degrees were awarded to 355 and graduate degrees to 137 persons during the year. Approximately 42% of these degrees were earned by women. Data were submitted on job placement for 389 (80%) of the 492 degree recipients. Of the 389, 73% were placed in full-time recreation positions, 9% took part-time positions in recreation, and 18% took jobs outside the field of recreation. The types of positions and percentage of graduates placed in each were as follows: public community recreation, 42.3%; private community recreation, 21.5%; army recreation, 7.8%; hospital recreation, 7.5%; institutional recreation, 6.8%; industrial recreation, 6.2%; college teaching in recreation, 3.3%; church recreation, 2%; camping (year-round position), 1.3%; and state level recreation, 1.3%.

After comparing the findings with those of three earlier studies, the following trends were pointed out: the number of students majoring in recreation in our colleges and universities is increasing; an increasing demand for recreation leaders in the armed forces, hospitals, and industry was reflected in the placement data.—*Jackson M. Anderson.*

71. FITZGERALD, G. B. Factors in the Selection of Professional Recreation Personnel. *Quarterly Bulletin of the American Recreation Society,* **4:** 2: 9–11 (Aug. 1952).

The study included reports from 92 cities, each having over 100,000 population. The reports were analyzed to determine the factors utilized in the selection of professional recreation personnel in the reporting cities. These selection factors were then rated by superintendents of recreation of fifty of the cities studied and by a jury of twelve recreation experts who were not superintendents of recreation. Recreation positions were classified as follows: superintendent and assistant superintendent; supervisor and assistant supervisor; director and assistant director; recreation leader; specialist; and manager.

The study resulted in the following conclusions: (1) the factors found to be utilized most often in the selection of professional recreation personnel for the above-mentioned positions were interview, application form, citizenship, education, and experience; (2) the factors found to be utilized least in selection were personal pattern of recreation, religion, nationality, marital status, residence, pre-employment in-service training, voluntary leadership experience, and performance tests; (3) many factors which are difficult to measure, such as courage, friendliness, and integrity were of more than considerable importance in the selection of professional recreation personnel; (4) all personal qualities were considered to be of considerable importance, or even of more significance, in selection in almost all cases.—*Jackson M. Anderson.*

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